

of public readings or lectures on agricultural questions for the benefit of different classes of the population, instruction of the teachers in public schools in agriculture, horticulture, gardening, apiculture, &c., and providing the public schools with small plots of land and means for cultivating the same; also by the teaching of agriculture in the normal schools, and the introduction of supplementary courses in agriculture in the village schools. There are now in Russia three schools for higher agricultural instruction, nine agricultural high schools, eighty-three lower schools, and fifty-nine special courses. Steps have already been taken for the establishment of about fifty additional agricultural schools.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. xxi. No. 4, October. —Memoir on the substitution-groups whose degree does not exceed eight, by Dr. G. A. Miller (pp. 287–338), is an exhaustive piece of work, amply furnished with bibliographical notes. The author's aim is to give enough of the general theory of group construction to find all the possible groups whose degree does not exceed eight without any tentative processes. The earliest work that gives considerable attention to substitution-groups is stated to be that by Ruffini, entitled "Teoria generale delle equazioni, in cui si dimostra impossibile la soluzione algebrica delle equazioni generali di grado superiore al quarto" (1799). The author has won his spurs in this field, and the present memoir shows a thorough mastery of his subject. There is a good table of contents appended. —On a class of equations of transformation, by J. Westlund. In this paper the writer discusses those equations whose roots are the $n + 1$ values of

$$\gamma_{\mu} = \prod_{\nu=1}^n \sin^{\alpha_{\nu}} \cdot \cos^{\beta_{\nu}} \cdot d\nu \quad (4p\omega/\kappa),$$

where α , β , γ , are any positive or negative integers, and

$$\omega = \frac{4\mu\kappa + 4\nu\kappa}{n},$$

μ and ν being integers. For the notation reference is made to Weber, "Elliptische Functionen," § 67. —Dr. Wilczynski, in an article entitled "On Linearoid Differential Equations," follows up a previous article in the *Journal* (April 1899). This he looks upon as being a reconnaissance upon a new field of promise. *Linearoid* "suggests" the relation of the present equations to linear differential equations. —Prof. W. H. Metzler contributes a short note on the roots of a determinantal equation. The theorem is similar to one discussed by Dr. T. Muir in vol. xix. (pp. 312–318). —Non-quaternion number-systems containing no skew units, by Dr. Starkweather, opens with a brief statement of a few properties of number-systems in general. Then follows a proof of a statement made by Scheffers (*Math. Ann.* xxxix. 306, 310) as to the possibility, in this special class of number-systems, of a selection of units having certain simple multiplicative properties. He then shows that the units can be chosen so as to give in general a very much simplified form of multiplication table, and a method is given for deriving systems of the type considered in n units from those in $(n-1)$ units. Application of the principles he deduces is made to systems, the degree of whose characteristic equation is two less than the number of units. Other points are discussed, and a table of all the possible non-equivalent forms is given.

VOL. VI. of the *Anales del Museo Nacional de Buenos Aires* contains the following papers: —Contributions to our knowledge of the herpetological fauna of Argentina and the neighbouring countries, by C. Berg; some cases of vegetable teratology, fasciation, proliferation, and synanthry (three plates), by A. Gallardo; species of *Ampullaria* of the Argentine Republic, by H. von Ihering; diagnostics of new South American Diplopoda, by F. Silvestri; new or critical Argentinian fungi (two plates), by C. Spegazzini; observations on Argentinian and other South American Lepidoptera, by C. Berg; brief comparative description of *Lepidocampa* and *Campodea* (two plates), by F. Silvestri; new South American Tenthredinidae, by F. W. Konow. Of these the fifth only is in Latin, and the last in German; the remainder are in Spanish.

THE numbers of the *Journal of Botany* for October and November are chiefly occupied by papers on descriptive and geographical botany. These are varied by an article, by Mr.

E. S. Salmon, on certain peculiar structures found on the peritheces of the parasitic fungus *Phyllactinia corylea*, which appear to have a function in connection with its dissemination. The degeneration of these structures produces mucilage, by which the perithece of the fungus is firmly attached to the leaf of the host-plant.

SOCIETIES AND ACADEMIES.

LONDON.

Entomological Society, October 4. —Mr. G. H. Verrall, President, in the chair. —The President announced the death, at the advanced age of eighty-six years, of M. Hippolyte Lucas, an Honorary Fellow of the Society. He also announced the death of Mr. Samuel Stevens, and in reference thereto said the Society had to deplore the loss of one of its oldest and most highly esteemed Fellows. —Mr. J. J. Walker exhibited a specimen of *Galerita bicolor*, Drury, a North American beetle of the family Carabidae, said to have been taken many years ago at Doncaster. He also exhibited a remarkable variety of *Vanessa urticae*, L. (*ichnusoides*, De Selys), which was captured in the Isle of Sheppey on August 28. —Mr. B. A. Bower showed dark aberrations of *Boarmia rhomboidaria*, Hb., in which the normal colour of the fore wings is replaced by dark brown, causing the fuscous markings to stand out very prominently. —Mr. C. J. Wainwright exhibited a number of Dipterous insects, including a long series of *Anthrax paniscus*, Rossi, taken in Cornwall at the end of July and beginning of August; a series of *Eumerus ornatus*, Mg., from Herefordshire, and *Eumerus lunulatus*, Mg., from Cornwall; and a specimen of *Mallota eristaloides*, Loew, taken near Hereford last July. —Mr. H. J. Donisthorpe exhibited specimens of *Dytiscus dimidiatus*, Berg., and *D. circumcinctus*, Ahr., taken last August in Wicken Fen. He also showed eight specimens of *Athous rhombeus*, Oliv., taken last June in the New Forest. —The Rev. F. D. Morice exhibited three female specimens of *Exoneura libanensis*, Friese, taken at Brumana on Mount Lebanon, near Beirut. He commented upon the remarkable distribution of the genus *Exoneura*, Smith, this genus having been hitherto recorded only from Australia. —Mr. G. J. Arrow read a paper on sexual dimorphism in the Rutelid genus *Parastasia*. —Mr. W. L. Distant contributed descriptions of four new species of Cicadidae, and Mr. Claude Fuller a paper on some species of Western Australian Coccidae.

Royal Microscopical Society, October 18. —Mr. E. M. Nelson, President, in the chair. —The President called attention to an old microscope by Cary, presented to the Society by Mr. Gleadow. An instrument of the same design was figured in the *Journal* for 1893, p. 474. —Messrs. Watson and Sons exhibited their new school microscope, which was provided with a diagonal rack and pinion coarse adjustment, but no fine adjustment, their idea being to produce a strong well-made instrument at a low price. Dr. Dallinger had seen this instrument, and thought it would admirably answer the purpose for which it was intended; the coarse adjustment was so well made that he had no difficulty in focussing a $\frac{1}{8}$ " objective with it. The President thought the microscope was strongly made and well fitted, and would be found to be a very useful instrument. Messrs. Watson also exhibited a new form of eye-piece, named the "Holoscopic," which was fitted with an adjustment to render it either over- or under-corrected and suitable for use with either achromatic or apochromatic objectives. —Dr. Measures exhibited a microscope for photo-micrography, made by Zeiss, having a new form of fine adjustment which admitted of the arm being made of any length without throwing extra weight upon the fine adjustment screw. Dr. Dallinger considered the way in which the speed of the fine adjustment had been reduced was most ingenious; the motion was extremely slow, being only $\frac{1}{8125}$ " for every revolution of the screw. A protest had always been made in the Society against the fine adjustment having to carry much weight, and it was therefore satisfactory to find that this one had to lift only one-fifth of the weight usually put upon the fine adjustment. The President said the application of an endless screw was a novel way of slowing down the fine adjustment; the reduction of weight upon the thread was an important improvement, and the increased length of arm was another good feature. —The President then described a new form of fine adjustment by Reichert, which was shown applied to his Austrian model, exhibited by Mr.

C. Baker; the indicator to this fine adjustment was movable, so that it could be set to zero when required, thus greatly facilitating the reading of the divisions on the head of the screw. The instrument was fitted with the English standard substage, and the axis of the trunnions was placed above the stage to ensure a better balance. Two other microscopes by Reichert were also exhibited, one being a student's without fine adjustment, but fitted with a dissecting loupe as a substage condenser. The President next showed a microscope fitted with his new stepped rackwork coarse adjustment by Messrs. Watson and Sons; there was no "loss of time," though the pinion was pressed but lightly into the rack. The President also exhibited a dissecting stand by Andrew Ross, which was about forty or fifty years old, and was still a thoroughly good working instrument; and though the lenses were not achromatic, they gave very good images.—Mr. C. Lees Curties exhibited some stereoscopic photo-micrographs taken on the Ives principle by Mr. E. R. Turner, who briefly described the method of taking them.—Dr. Hebb said they had received part vi. of Mr. Millett's "Report on the Foraminifera of the Malay Archipelago," which would be taken as read and published in the *Journal*.—Mr. F. Enock gave an extremely interesting account of his observations on the life-history and habits of British trap-door spiders, illustrating the subject with most excellent original lantern views.

MANCHESTER.

Literary and Philosophical Society, October 17.—Prof. Horace Lamb, F.R.S., President, in the chair.—The Secretary read the draft of the address which was recently presented by the Society to Sir G. G. Stokes, Bart., on the occasion of the jubilee of his tenure of the Lucasian Professorship of Mathematics at Cambridge University, and also the reply received thereto.—Prof. Dixon stated that the restoration of Dalton's tomb had been effected under the direction of the committee appointed, and that there remained a balance in hand of about 27*l*. It was hoped to raise this sum to 50*l*., and to form a vested fund which would provide for any future repairs that might be necessary.—The President announced that the Society had had presented to it another relic of Dalton, in the shape of his diploma of honorary membership of the Edinburgh Medical Society, to which he was elected in 1818.—Mr. Thomas Thorp read a paper on diffraction grating films and their application to colour photography, and exhibited an apparatus which showed photographs of objects in their natural colours by the aid of gratings, and without the use of pigments or dyes.—A paper entitled "On the electrical resistance between opposite sides of a quadrilateral, one diameter of which bisects the other at right angles," was read by Dr. Charles H. Lees.

NEW SOUTH WALES.

Royal Society, July 5.—Mr. W. M. Hamlet, President, in the chair.—Suggestions for depicting diagrammatically the character of seasons as regards rainfall, and especially that of drought, by H. Deane. The author called attention to the inadequacy of the ordinary methods of judging of the dryness or otherwise of seasons by using the totals of the rainfall and comparing them with the average. He explained that the proper way of exhibiting the character of any period is by showing diagrammatically the progressive dryness that takes place in the soil after rainfall ceases. This is marked by a descending line, and being from time to time more or less compensated for by falls of rain, these are indicated by rises. The only useful rain to the soil itself is what soaks in and tends to saturate it; all beyond this, although it may be useful for conservation and for keeping up the flow of rivers, is waste so far as the particular ground on which the rain has fallen is concerned. The diagrams exhibited show the effect of this "loss and compensation" system, and the dryness of the years and parts of years given in the series 1883 to 1898, inclusive, are rendered visible and measurable.—The initiation ceremonies of the aborigines of Port Stephens, New South Wales, by W. J. Enright.

August 2.—Mr. W. M. Hamlet, President, in the chair.—On the crystalline camphor of eucalyptus oil (eudesmol) and the natural formation of eucalyptol, by Mr. Henry G. Smith. In August 1897, the author, with Mr. R. T. Baker, announced the discovery of a crystalline camphor or stearoptene in eucalyptus oil. This substance was named *eudesmol*. The present paper deals with the chemistry of this camphor and its relation to eucalyptol. Eudesmol has been found in the oil of many species of eucalyptus, and should be present at certain times of

the year in all those eucalyptus oils that are eventually rich in eucalyptol. Eudesmol has a formula $C_{10}H_{16}O$, is isomeric with ordinary camphor, but has the oxygen atom combined in a different manner. It does not appear to be ketonic, and it cannot be reduced by sodium in alcohol or by other methods. It is optically inactive. It forms a dinitro-compound and a dibromide, but does not form a nitroschloride. It melts at 79–80° when perfectly pure, but has a tendency to form products having a lower melting point. On oxidation with dilute nitric acid, camphoronic acid is formed, but no camphoric acid. A large amount of evidence is brought forward to show eudesmol to be intermediate in the formation of eucalyptol, and that eucalyptol is derived directly from the fraction containing eudesmol if the oil be kept in the crude condition for some time under ascertained conditions. Oxygen is necessary to this alteration. It is shown that the oxygen atom enters the eucalyptol molecule during the formation of eudesmol, and that by the natural alteration of the high boiling fraction of oils containing eudesmol (*E. macrorrhyncha*, for instance) eucalyptol is formed. The synthesis by Perkin and Thorpe (*Journ. Chem. Soc.*, 1897, 1169) shows camphoronic acid to be trimethyl tricarballic acid, as was first suggested by Bredt, and as eucalyptol is derived from eudesmol, and eudesmol forms camphoronic acid, the question is raised whether Brühl's formula for eucalyptol is correct. It is suggested that the oxygen atom in eudesmol is quadrivalent, and that the peculiarity of eucalyptol may be thus accounted for. From the formula suggested for eudesmol camphoronic acid, as trimethyl tricarballic acid, can be constructed.—Observations on the determination of the intensity of drought, by Mr. G. H. Knibbs. The paper was really a continuation of the subject of Mr. H. Deane's paper, read at a previous meeting. It was shown that if the degree of saturation of ground was taken as the reciprocal of the measure of drought intensity, as suggested by Mr. Deane, then, theoretically, it was determinable. The essential features of Mr. Deane's solution and of the nature of the problem were discussed.—Divisions of some aboriginal tribes, Queensland, by Mr. R. H. Matthews. A short paper dealing with the social organisation of some native tribes of Queensland.

PARIS.

Academy of Sciences, October 30.—M. van Tieghem in the chair.—Remarks on the volume, "Connaissance des Temps pour l'année 1902," by M. Poincaré. This work contains an important improvement as the result of a conference of directors of observatories in England, Germany, America and France. This year the work contains the mean positions of all the stars in Prof. Newcomb's catalogue, the apparent positions of which do not already appear in one of the four official publications.—On the intervention of plants in the formation of calcareous tufa, by M. de Lapparent. The author points out that the results published by M. Stanislas Meunier in the last number of the *Comptes rendus*, concerning the function of mosses and microscopic algæ in the formation of calcareous tufa, were discovered as far back as 1862 by M. Cohn.—On the Giacobini comet, by M. Perrotin. The elements of the comet have been calculated by M. Giacobini, from the observations made in various observatories. The form of the orbit is at present sensibly parabolic. At the time of its discovery the nebula surrounding the nucleus amounted to 1.5 minutes of arc; at the present time this is reduced to 1.0 minute. The nucleus appears to have increased in lustre, being now of about the eleventh magnitude.—Remarks by M. Fouqué on the alterations introduced by M. de Lapparent in the new edition of his "Treatise on Geology."—On the hyperabelian functions, by M. Georges Humbert.—On congruences of normals, by M. E. Goursat.—On the propagation of electric oscillations in dielectric media, by M. Albert Turpain. The author quotes the expressions of Maxwell and of Helmholtz and Duhem for the relations existing between the velocity of light, the velocities of propagation of the Hertzian waves in different media, and the dielectric constants of those media, and shows that the experiments of Arons and Rubens, Cohn and Zeeman, and of Blondlot do not clearly distinguish between the Maxwell and Helmholtz-Duhem hypotheses. The author describes an experiment which he believes to be free from ambiguity, the results of which are in accord with the views of Helmholtz and Duhem.—Transmission of Hertzian waves through liquids, by M. Édouard Branly. The receiver was placed in the centre of a large glass vessel containing the liquid

under examination, and measurements were made of the distance to which the exciter had to be removed to produce no effect upon the receiver. Distilled water or spring water possesses a much greater absorptive power for the rays than oil or air, and the effect of sea water was so great that any thickness over 20 cm. was sufficient to completely absorb the radiations, its power of arresting the rays being greater, in fact, than the same thickness of cement.—On Wehnelt's electrolytic interrupter, by M. E. Rothé. The author describes a curious phenomenon produced by varying the resistance of the circuit. For any given interrupter with a fixed potential difference, there appears to be a limiting resistance, such that for all lower resistances a condition of rapidly varying current strength only is possible. For all higher resistances there may be either the same state of affairs, or a steady current, according to the manner in which the current is established.—On the atomic weight of boron, by M. Henri Gautier. Analyses of boron chloride and bromide lead to values for the atomic weight of boron of 11.01 and 11.02 respectively, single determinations varying between 10.98 and 11.04. The chloride and bromide were prepared from the halogen and boron, the latter being prepared by Moissan's method. The author considers that his products were free from dissolved hydrobromic or hydrochloric acids, and that the lower figures obtained by Abraham (10.84) by the analysis of boron bromide, were due to traces of hydrobromic acid dissolved in the halogen compound.—On the mixed oxyhydrides of fatty and aromatic acids, by H. A. Béhal. The existence of the mixed anhydrides discovered by Gerhardt has been called in question by Rousset, but comparative experiments carried out by the author upon a mixture of benzoic anhydride and acetic anhydride and the mixed acetobenzoic anhydride prepared by Gerhardt's method show that the mixed anhydride really exists, although always containing a little benzoic anhydride as an impurity.—Naphthopurpurin, an oxidation product of naphthazarin, by M. Georges F. Joubert. The analogy between the behaviour of alizarin and naphthazarin is further shown by the ready oxidation of the latter by sulphuric acid and manganese peroxide to naphthopurpurin, or tri-oxy-naphthoquinone.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 9.

MATHEMATICAL SOCIETY, at 8.—Certain Correspondences between Spaces of n Dimensions: Dr. E. O. Lovett.—On the Form of Lines of Force near a Point of Equilibrium; The Reduction of Conics and Quadrics to their Principal Axes by the Weierstrassian Method of reducing Quadratic Forms; and on the Reduction of a Linear Substitution to a Canonical Form; with some Applications to Linear Differential Equations and Quadratic Forms: T. J. L. Bromwich.—On Ampère's Equation $Rr + zSs + Tt + U(u^2 - S^2) = V$: Prof. A. C. Dixon.—The Abstract Group Isomorphic with the Symmetric Group on k Letters: Dr. L. E. Dickson.—The Fundamental Solutions of the Indeterminate Relation $Ax^2 + By^2 = Cz^2$: Major MacMahon, R.A., F.R.S.—Note on Clebsch's Second Method for the Integration of a Pfaffian Equation: J. Brill.

FRIDAY, NOVEMBER 10.

ROYAL ASTRONOMICAL SOCIETY, at 8.—*Papers received*: Observations of Mars, 1898-99: Rev. T. E. R. Phillips.—Observations of Jupiter and his Satellites at Mr. Crossley's Observatory, Bermer-ide, Halifax, 1898-99: J. Gledhill.—Observations of Nebulæ made at the Chamberlin Observatory, Denver: H. A. Howe.—(1) On the Probable Proper Motion of the Annular Nebula in Lyra; (2) The Exterior Nebulosity of the Pleiades; (3) Diameters of Ceres and Vesta: Prof. E. E. Barnard.—*Papers promised*: Theory of the Figure of the Earth carried to the Second Order of Small Quantities: Prof. G. H. Darwin.—Distribution of Stars Photographed at Oxford for the Astrographic Catalogue: F. A. Bellamy.—Variation of Personal Equation with Stellar Magnitude: Prof. H. H. Turner.—Photographic Magnitudes: a Comparison of the Greenwich Astrophysical Plates with the Magnitudes of the Bonn Durchmusterung: F. W. Dyson and H. P. Hollis.—Ephemeris for Physical Observations of Jupiter, 1899-1900: A. C. D. Crommelin.

PHYSICAL SOCIETY (Central Technical College, Exhibition Road, South Kensington), at 5.—Contact Electricity: F. S. Spiers.—On the Heat of Formation of Alloys: J. B. Tayler.

MALACOLOGICAL SOCIETY, at 8.—Additions to the List of Marine Shells of South Africa published in 1897, with Descriptions of Seventeen New Species: G. B. Sowerby.—Remarks on a Collection of Helicoid Hand-Shells from Japan and the Loo-Choo Islands: G. K. Gude.—*Metastrakon*, a New Slug-like Genus of Dart-bearing Helicidæ: Henry A. Pilsbry.

MONDAY, NOVEMBER 13.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Opening Address: The President.—Travels in Bokhara: Willy Rickmer Rickmers

TUESDAY, NOVEMBER 14.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Waterloo and City Railway: H. H. Dalrymple-Hay.—The Electrical Equipment of the Waterloo and City Railway: B. M. Jenkin.

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MINERALOGICAL SOCIETY, at 8.—Florentite, a New Hydrated Phosphate of Aluminium and Cerium Earths from Brazil: Dr. Hussak and Mr. Prior.—On a New Mineral from Cornwall: Mr. Hutchinson.—Mineralogical Notes: Prof. Miers.—On Various Sulpharsenites of Lead from the Binnenthal: Mr. Solly; with Analyses by Mr. Jackson.—Crystallised Stannite from Bolivia: Mr. Prior and Mr. Spencer.—On the Constitution of the Mineral Arsenates and Phosphates. Part IV. Beudantite: Mr. Hartley.—Petrographical Notes on some Rock Specimens from the Little Island of Trinidad, South Atlantic: Mr. Prior.

WEDNESDAY, NOVEMBER 15.

SOCIETY OF ARTS, at 8.—Opening Address: Sir John Wolfe Barry, K.C.B., F.R.S.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The Diurnal Variation of the Barometer in the British Isles: Richard H. Curtis.—Note on Earth Temperature Observations: G. J. Symons.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Foraminifera: A. Earland.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, NOVEMBER 16.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Note on the E.M.F. of the Organ Shock, and on the Electrical Resistance of the Organ in *Malapterurus electricus*: Prof. F. Gotch and G. J. Burch.—On the Formation of the Pelvic Plexus, with especial reference to the Nervus Collector in the genus *Mustelus*: R. C. Punnett.—On the Least Potential Difference required to produce Discharge through various Gases: Hon. R. J. Strutt.—On the Propagation of Earthquake Motion to Great Distances: R. D. Oldham.—An Experimental Research on some Standards of Light: J. E. Petavel.

LINNEAN SOCIETY, at 8.—The Comparative Anatomy of certain Species of *Encephalartos*, a Genus of the *Cycadaceæ*: W. C. Worsdell.—On a Collection of *Brachyura* from Torres Straits: W. T. Calman.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.

CHEMICAL SOCIETY, at 8.—The Chlorine Derivatives of Pyridine. Part IV. Constitution of the Tetrachloropyridines: W. J. Sell and F. W. Dootson.—Contributions to our Knowledge of the Aconite Alkaloids. Part IV. On Japaconite and the Alkaloids of Japanese Aconite: Wyndham R. Dunstan, F.R.S., and H. M. Read.—On the Determination of Transition Temperatures: H. M. Dawson and P. Williams.

FRIDAY, NOVEMBER 17.

ANATOMICAL SOCIETY, at 4.—A Persistent Left Inferior Vena Cava: Stanley Boyd.—Specimen of Sacculated Esophagus: Miss Stoney.—Child's Skull, showing Parietal Perforations: Prof. A. M. Paterson.—Note on the Morphology of the Biceps Flexor Cruris: Prof. B. C. Windle, F.R.S., and F. G. Parsons.—Lantern Demonstration of certain Points in the Lymphatic System of the Appendix: C. B. Lockwood.

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